

HONORS PHYSICS

Purpose

Honors Physics is a rigorous introductory course designed for students with a high interest and aptitude in the sciences. Instruction includes algebra-based problem solving (with some trigonometry), applying the concepts and laws of Physics, and laboratory activities related to the topics being studied. Students will gain a solid foundation in Physics topics, in preparation for college-level (or A.P.) work.

Topics covered include: Motion, Forces, Energy, Electricity, Magnetism, Waves/Sound/Light.

OBJECTIVES (* denotes optional topics, to be studied as time or interest permit).

- A. **Physics in the Real World;** Students will investigate Physics topics, including: Applications of Physics, History/Scientists, Careers, and Current Events.
- B. **Error Analysis;** Students will evaluate laboratory procedures and data in terms of accuracy, precision, sources and implications of errors.
- C. **Graphing;** Students will construct and interpret graphs from data.
- D. **Kinematics in 1-Dimension;** Students will describe and calculate the motion of objects moving in one direction.
- E. **Vectors;** Students will perform vector calculations (addition, subtraction, components) and apply the concept of independence of vectors.
- F. **Motion in 2-Dimensions;** Students will describe and calculate the motion of objects moving in two dimensions (projectile motion).
- G. **Dynamics;** Students will state and apply Newton's three laws of motion.
- H. **Universal Gravitation;** Students will explain the relationships in Newton's Law of Universal Gravitation, and perform related calculations.
- I. **Work and Energy;** Students will define and apply the concepts of work, energy, machines, and conservation of energy.
- J. **Momentum;** Students will define and apply the concepts related to momentum changes and conservation.
- K. **Circular and * Rotational Motion*;** Students will describe the causes of circular and *rotational motion, and perform related calculations.
- L. **Rotational Equilibrium and * Dynamics*;** Students will calculate torque and perform equilibrium calculations.
- M. ***Kepler's Laws*;** Students will describe and apply the laws that govern planetary motion.
- N. **Electrostatics and Electric Fields;** Students will describe static electricity—the transfer of charge, the forces involved, and the nature of electric fields.
- O. **Electric Current and Circuits;** Students will solve series and parallel circuits and explain applications of circuits.
- P. **Magnetism;** Students will explain the causes of magnetism and magnetic fields.
- Q. **Waves and Sound;** Students will describe and calculate the characteristics and behaviors of mechanical waves and sound.
- R. **Light and Optics;** Students will study the properties and behaviors of light, and characterize the images formed by mirrors and lenses.

* Optional topics, as time and interest permit.